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was completed, including paving and the building of bridges and grade separations. Resurfacing and other construction work on these highway routes through cities represented an expenditure for the fiscal year of $1,350,617.30.

This expenditure may seem startling, especially in comparison with construction costs on rural highways in the state system; but you must remember that where surfaces on rural highways are 18 to 20 feet in width, the city streets improved were from 36 to 56 feet in width—two to three times the width of the rural highways.

Perhaps you can appreciate the cost of improvement and maintenance work done on these state highway routes through these 79 cities when you realize that the amount spent during the past fiscal year would have made possible the construction of 50 miles of ordinary two-lane, high-type roads in the rural areas. It would build such a road from Lafayette to Indianapolis. Or, with these funds, the Commission could have constructed a highway designed as a county feeder road extending from Lafayette to Jeffersonville, a distance of 175 miles.

When you realize that during the past fiscal year $1,765,-656.72 of state highway funds were expended on construction and maintenance of the 410 miles of state highway urban routes, I am sure that you can appreciate how the financial responsibilities imposed by the General Assembly are being met by the Commission.

These figures and operations have been cited to demonstrate just what the new responsibilities resulting from new legislation have meant to the State Highway Commission and the effect that this legislation has upon funds received by the Commission for the operation of the state highway system as well as the services performed.

Members of the State Highway Commission realize that the city and county officials charged with the care of roads and streets also have their problems and that their activities are guided by legal restrictions. It is the hope of the Commission, that through a better understanding, the counties and cities can co-operate in giving the Indiana motorist a road and street system that can be traveled with even greater comfort, convenience, and safety.

OUR RESPONSIBILITIES ON STATE ROADS AND ROUTES THROUGH CITIES

W. P. Cottingham,
City Engineer, Gary, Indiana

It might be expected that a city official would discuss this subject from the viewpoint of one who objected to the assignment of responsibility for state roads and routes through

cities to the State Highway Commission. Let me assure you at the outset that I do not take that position, — in fact, I welcome the realization that there is a group to whom I can pass the buck when the going gets tough at home. And it does get tough when the state roads through Gary begin to carry their load of summer traffic in addition to the regular load of interstate trucks.

We are all liable to get excited over every encroachment upon the rights of towns and cities for complete home rule; but we are equally insistent that the larger units of government, the township, county, the state, or the nation, must share in, or assume, full charge of, and responsibility for, those functions that affect units larger than our own. Certainly, the function of planning and building highways to carry interstate traffic is much more than a local problem, and properly is placed in the responsible charge of the State Highway Commission.

In the earlier days of operation under the State Highway Commission, our cities were clamoring for highways to their city limits from all directions. Gary was no different from any other city. We fought for the construction of the Dunes Highway between Gary and Michigan City bringing its load of traffic from Michigan to Chicago. We fought for an outlet to the south and were not satisfied until a state route was established on South Broadway which leads into our principal north and south business street.

In those early days, when all the territory between Gary and Chicago was through other cities of the Calumet Region, it was impossible to secure a state road to the northwest, and we used the township and county procedure to secure the needed connection between East Chicago, Hammond, and Whiting to the southeastern gateway to Chicago.

When amendments to the State Highway Commission legislation made it possible to take over and improve city streets as state highways, we had established routes in use that appeared so logical that no changes were made, and the heavy traffic of trucks and pleasure cars was conducted over our city streets on designated state routes. Expensive and extensive improvements followed, and the traffic increased to such an extent that we are now faced with the problem of securing a by-pass to take the burden of traffic off our streets where we put it in the first place.

PROBLEMS NEEDING SOLUTION

We in Gary recognize that we have a goodly share of responsibility for the planning of the state routes through our territory, and we are undertaking to assist in solving the problem. U. S. 12 and U. S. 20 go through Gary from east to west on 4th and 5th Avenues across the northwestern part of the city and combine on a single right of way about two

miles east of Broadway. Both roads are heavily traveled, carrying the traffic from the Chicago area to Michigan; and both cross the four main north and south streets carrying the local traffic to the steel mills along Lake Michigan. In Gary, when the summer traffic on holidays like the 4th of July or Labor Day on Routes 12 and 20 meets the cross traffic of the thousands of cars carrying workmen to and from the mills on Buchanan Street and Broadway, there is a traffic snarl that blocks streets and avenues miles away. In the intersections where school children must cross to schools and where pedestrians cross to local business districts and workmen cross to and from the mills, traffic becomes terribly complicated, and the congestion is having its effect upon the residential property values.

For many years there has been progressive planning for a modern super-highway between Chicago and Detroit and also for the Three-State Highway in Wisconsin, Illinois, and Indiana. Considerable work has been done in Wisconsin and Illinois on the Three-State Highway, and the problem is now closer to Indiana than it has ever been. It is the purpose of Gary to undertake to stimulate some immediate activity on some part of such a highway to relieve our local situation.

We agree with the Commissioner from Michigan in his statement that it is a detriment to a city to have traffic brought to its door in increased volumes with no arrangements made for its dispersion on the city traffic arteries.

When Chicago and Detroit, the second and fourth largest cities in this country, are linked together by the construction of a swift, safe, modern highway, the road will be through the northwestern part of Indiana and through Gary. The final responsibility for its location and construction in Indiana will be upon the State Highway Commission. Under existing legislation, the cities affected will necessarily be called upon for co-operative effort in planning the right-of-way and the control of traffic to be imposed thereon. Gary is preparing to take her part of the responsibility, particularly in reference to the control of traffic.

An important step in this direction was taken early last year when Mayor Schaible, acting under the provisions of the model traffic ordinance adopted by the City of Gary, secured a traffic engineer to conduct engineering investigations of traffic conditions and to co-operate with other city officials in the development of ways and means to improve traffic conditions. Our traffic engineer was drafted from Wichita, Kansas, and his selection was due to his experience and training rather than political preferment. His co-operation with all departments in bringing results and his work with the traffic officials of the state highway commission are part of our contribution to the general problem of traffic regulation.

Our city planning commission, in co-operation with the Chicago Regional Planning Association, is attempting to assume some of the responsibility for planning future traffic routes through Gary and the Calumet Region; and while not wishing or intending to usurp any of the responsibility placed on the State Highway Commission, we do feel that the local group has a definite responsibility to the city and can best serve that responsibility by intelligently sharing the burden with the state authorities.

FUNDAMENTALS OF ROAD AND SUBGRADE STABILIZATION

W. R. Woolley,
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Doubtless many of you have read the title assigned to me and have wondered just exactly what I might select to talk about. Engineers have built gravel roads for many years. Sometimes we call them traffic-bound roads. A few years ago the word "stabilization" began to be heard frequently. Most of us did not know exactly what was meant when we talked of a stabilized road—and we still don't know. In fact, this question came up in the materials group at the last meeting of the American Association of State Highway Officials and a committee was appointed to write a definition of stabilization. Inasmuch as we do not at present have a definition of my subject, it seems to me that my field is unlimited.

Because gravel and crushed stone are available over a large part of Indiana, many of us have become accustomed to think of a stabilized road as one consisting of gravel or crushed stone that has been tied down by clay and chemical. We think of a traffic-bound road as one on which we have placed a granular material with the hope that it compacts under traffic in somewhat less than a year, whereas we think of a stabilized road as one that is thoroughly compacted and stabilized as a part of the construction. I do not think that this idea of a stabilized road is one that will conform with the definition that will be suggested by the committee appointed to define stabilization. But suppose that, for the purpose of discussion, we assume that we are planning to build a road of this type about six inches thick. Let us suppose also that at least a part of the subgrade on which we plan to place the new surface is heavy clay. We all know that this relatively thin course of stabilized aggregate on a wet clay subgrade will not carry heavy traffic satisfactorily. As was pointed out by Mr. Macadam, for whom the macadam-type road was named, over one hundred years ago, the subgrade must carry the load transferred to it by the base course.